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# FLUID PROVIDER ASSEMBLY AND PORTABLE FLUID PROVIDER SYSTEM ~~INCLUDING SAME~~

## BACKGROUND OF THE INVENTION

The present invention relates generally to fluid providers, and more particularly to a portable fluid provider system for receiving fluid, pressurizing fluid, and transporting the pressurized fluid into a fluid containing member.

The need to translocate large yet delicate or heavy objects without damaging the object or the transfer surfaces spans the gamut of practical applications. From industrial to medical settings, it is often impossible to move an object (load) or person without the aid of a transfer device to assist in the transport.

One application example includes moving medical patients, such as accident victims, the elderly, or comatose, paralyzed or otherwise immobilized patients, who are frequently difficult to transfer or move in a safe, comfortable manner from one support surface, such as a bed, to another support surface, such as a gurney or wheeled hospital cart. Patients who cannot by themselves sit up or move can be particularly difficult to move from a stretcher to a bed or vice versa, and repositioning such patients frequently requires two or three people (e.g., nurses, orderlies or other attendants). That situation is not desirable, however, as it naturally gives rise to the possibility that the medical personnel themselves will incur back or other injuries, particularly if the patient is unusually heavy or completely immobilized. Notwithstanding the painful nature of the injury itself, such medical personnel injuries can also result in lost time and workers compensation claims.

Another situation calling for the aid of a transfer device involves moving bulky and/or heavy industrial loads. Moving objects, such as large machine parts or household appliances, even over relatively short distances, often requires multiple human movers or a hoist, fork truck, conveyor, or the like. There are some situations, however, where hoisting, conveyor transfer or ordinary pallet and fork truck transfer is not possible or practical. For example, fork trucks cannot practically be used in residential settings to remove old appliances, such as refrigerators and washing machines and the like, or reposition new appliances. Moreover, moving furniture, even over short distances within a room or building, can damage both the furniture and the floor. Providing a safe and effective portable transport system is especially important in cases where protecting the flooring surface, such as

hardwood or high end marble or ceramic tile, is as much a consideration as protecting the load.

As mentioned above, the range of applications desiring an alternative transport system is vast. Other examples of heavy or bulky yet delicate objects which require occasional and careful transport, often between pristine surfaces, include artistic sculptures or other museum exhibits, and large animals (e.g., horses, cattle, deer or elephants) in need of medical attention at farms, zoos, conservation sites or veterinary hospitals.

In recent years, various transfer devices have been developed, mainly in the area of human medical patient transfer, which can be placed either temporarily or semi-permanently under a person already on a bed or stretcher and then inflated. The entire transfer device is then moved onto another surface along with the patient. These transfer devices frequently take the form of air mattress-type movers. Such air mattress-type movers have been provided with small perforations in the bottom and a supply of compressed air to obtain and at least temporarily maintain inflation. During such inflation, a continuous supply of pressurized air is expelled from the bottom of the transfer device to form a fluid film which supports the inflated transfer device or mat on any reasonably flat, semi-continuous surface in the same manner as an air pallet used for industrial applications within shops and plants.

The same concept is generally applicable across the board for the translocation needs described above. An inflatable transfer pad can be positioned beneath a heavy or bulky object by lifting the object only a minimal amount, inflated with fluid, such as air, and moved along with the object to another surface or another portion of the same surface. Although air pallets for industrial and medical use and compressed air pumps for inflating the air pallets are generally known, room for improvement exists. The assignee of the present invention has also disclosed an improved material mover that incorporates a pressurized fluid (i.e., a gas, such as air, or a liquid, such as an oil) in U.S. Patent Application Serial No. __________ entitled "Material Mover Having A Fluid Film Reservoir," filed concurrently herewith, which claims the benefit of U.S. Provisional Patent Application Serial No. 60/425,673, filed on November 12, 2002, the entireties of which are incorporated herein by reference.

As mentioned above, the need for moving such objects or medical patients often arises in situ, and as such, demands a portable means for providing and pressuring the fluid used in the inflatable transfer device. Although conventional small pumps/compressors can be carried about fairly easily, problems exist in using these conventional pumps/compressors in connection with the inflatable transfer devices described above.

One problem is that the air compressors must be small in order to be deemed "portable." Small air compressors or fluid pumps have a reduced capacity to provide pressurize fluid to a transfer device. This problem is particularly troublesome when the load is very large or heavy and a significant amount of pressure is needed in order to inflate the transfer device. Parallel arrangements of multiple, individual fluid pumps or air compressors can provide the necessary pressure simultaneously when connected at various points on the transfer device. This arrangement, however, limits the effective portability and reduces the maneuverability of the transfer device since a multiple number of individually powered units are required to be connected at multiple positions around the transfer device.

Another problem is that the pump or air compressor must be oriented in a specific position, particularly so that air can be accepted into the unit and such that the unit can operate without overheating. In conventional models, the pump is often oriented in a horizontal direction rather than a vertical direction. This orientation, however, requires more lateral space, and access to typically side-mounted operational controls, connections and power supply ports can be inconvenient. Furthermore, after being brought into the desired location, the pump must be removed from the container or bag in which it was carried and repositioned to allow proper air flow to the unit and to gain access to the controls and power for operation.

Yet another problem is that typical air compressors and fluid pumps tend to generate a great deal of noise during operation, which is particularly undesirable in a hospital or nursing home setting. Conventional methods for damping sound, such as covering the loud air compressor or fluid pump with a blanket, pillow or otherwise physically muffling the loud sounds emitted therefrom, tend to induce the risk of overheating and inhibit the ability of air to properly flow into the compressor.

Thus, it would be desirable to provide a portable fluid provider system that overcomes the drawbacks of the prior art. It would be particularly desirable to provide a cost effective portable fluid provider that enables quiet operation in a compact space without incurring the risk of overheating. It would also be desirable to provide a portable fluid provider system that enabled series interconnection with other fluid providers to maximize the final fluid output pressure and volume fed into a single filling port on a transfer device.

## SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the drawbacks of the prior art, particularly to provide a cost effective portable fluid provider that enables quiet operation in a

compact space without incurring the risk of overheating. It is another object of the present invention to provide a portable fluid provider system that enables interconnection with a plurality of other fluid providers to maximize the final fluid output pressure and volume fed into a single filling port on a transfer device.

According to one embodiment of the present invention, a fluid provider assembly is provided, including a fluid provider housing having an intake end for receiving fluid into the housing and an opposed output end for expelling fluid out of the housing. An intake faceplate having a fluid intake vent portion is provided to allow fluid to be received into the housing. A motor unit is positioned within the housing, and a fluid pressurization unit is interposed between the intake end and the motor unit. The fluid pressurization unit can be a fan unit, or another member, such as a piston-type fluid pressurizer. The fluid pressurization unit operates to pressurize fluid within the housing such that fluid expelled from the output end has a higher pressure than fluid received through the intake end.

The intake faceplate is preferably removable and preferably includes a contact surface configured to be detachably connected to the intake end. Preferably, the intake faceplate includes a plurality of leg members extending therefrom in a direction substantially perpendicular thereto. The leg members are preferably dimensioned to enable substantially uninhibited fluid flow access into the intake when the fluid provider housing is vertically oriented such that the intake end is positioned proximate a supporting surface on which the assembly is located.

Preferably, a coupling plate is also provided. The coupling plate preferably includes a contact surface configured to be detachably connected to the intake end of fluid provider housing in substantially the same manner as the intake faceplate after the intake faceplate is removed from the intake end of the housing. The coupling plate also includes a coupling member adapted to connect the intake end to an output end of another fluid provider.

An intake shield is also preferably provided positioned within the housing, spaced a distance from the intake end and interposed between the intake end and the fluid pressurization unit. The intake faceplate preferably includes an access door, and a fluid filter is preferably interposed between the intake end and the intake shield in a position corresponding to at least a portion of the filter access door.

The fluid provider assembly of the present invention facilitates an increased fluid pressurization capacity by enabling a series connection of multiple fluid providers, or a parallel connection via a manifold (e.g., a branched connector) attachment. In a series type

connection, the fluid providers can be longitudinally oriented such that the coupling plate positioned on the fluid intake end of one fluid provider connects to the output end of another fluid provider, either directly or via a short length of hose. In a manifold parallel arrangement, the manifold adapter includes a single outlet port to be connected to a transfer device and a plurality of parallel inlet ports to accommodate multiple fluid providers.

Although a plurality of fluid providers may still be required to increase the ultimate maximum pressurization capacity and volumetric output of the fluid provider system, only one of the fluid providers actually needs to be connected to the inflatable transfer device. This single port connection arrangement does not impede or inhibit the overall maneuverability of the transfer device. Moreover, connecting the fluid providers in series in this manner allows for an increase in the final output pressure fed into one inlet port of a transfer device while using fewer fluid providers than would otherwise be required for the prior art parallel arrangement described above.

The leg members provided on the intake faceplate enable the fluid provider to be operated in a stable, vertically oriented position as well as the longitudinal (sideways) orientation described above. Because the distance between the support surface on which the fluid provider is located and the fluid intake vent is determined by the height of the leg members, an adequate clearance can be maintained and fluid flow into the fluid provider is virtually uninhibited, even during vertical orientation where the intake vent is effectively positioned on the bottom surface of the fluid provider.

According to another embodiment of the present invention, a fluid provider is provided, including a fluid provider housing having an intake end for receiving fluid into the housing and an opposed output end for expelling fluid out of the housing. The fluid provider also includes a power supply connection member positioned on the output end, a fluid conduit coupler member positioned on the output end and an operational control switch positioned on the output end. A motor unit is positioned within the housing and a fluid pressurization unit is interposed between the intake end and the motor unit. The fluid pressurization unit serves to pressurize fluid within the housing such that fluid expelled from the output end has a higher pressure than fluid received through the intake end.

The fluid provider preferably includes a control switch cover positioned to substantially surround the operational control switch and adapted to allow access to the control switch for deliberate engaging or disengaging of an operational mode of the fluid provider while preventing unintentional engaging or disengaging of the operational mode. This is particularly important given that the fluid provider can be positioned within and

completely enclosed by a sound damping carrying case, as described in more detail below. The switch cover also protects the position, either on or off, of the switch in that the fluid provider cannot be suddenly and unexpectedly engaged before the desired operation time or unexpectedly and accidentally disengaged during a delicate transfer.

It is also preferred that the fluid conduit coupler member is provided with a contact surface that provides a locking relationship with an end of a fluid conduit, such as a hose, an adapter or a manifold, or with a coupling member on a coupling plate. More preferably, the fluid conduit coupler member is configured to engage and lock-in one end of a fluid conduit with a simple twist and click. This enables fast and efficient fluid conduit or connector plate connection with little need for adjustment and without the need for additional sealing or securing members. In that manner, the portable fluid transfer system can be properly set up and used quickly, especially in cases of emergency medical patient transfer. The lock-in feature beneficially prevents unintentional disengagement of the fluid conduit or coupling plate from the fluid provider during operation.

An output shield is also provided, positioned within the housing and spaced a distance from the output end such that it is interposed between the output end and the motor unit. The output shield protects the motor from external elements, allows for the passage of fluid through the system, and helps to reduce the noise output from the motor during operation. This sound damping feature, in combination with the other sound damping features of the present invention, further enables quiet and efficient fluid transfer in sound-sensitive situations.

According to yet another embodiment of the present invention, a portable fluid provider system is provided. The portable fluid provider system includes a fluid provider assembly including a fluid provider housing having an intake end having a fluid intake vent for receiving fluid into the housing and an opposed output end having a fluid output vent for expelling fluid out of the housing, a motor unit positioned within the housing, and a fluid pressurization unit interposed between the intake end and the motor unit for pressurizing fluid within the housing such that fluid expelled from the output vent has a higher pressure than fluid received through the intake vent, the fluid pressurization unit being spaced a distance from the intake end of the housing. The portable fluid provider system also includes a portable sound damping case in which the fluid provider assembly is positioned. The case has a base side, peripheral sidewalls, and a closeable top side. The base side has a fluid intake vent located at a first position which is laterally offset (i.e., spaced a distance) from a center point of the base. The fluid provider is positioned within the case such that the intake

end of the fluid provider assembly is located proximate the base of the case. The fluid intake vent of the fluid provider assembly is located at a second position, which is laterally offset from the first position. Preferably, the second position is centrally located such that it roughly corresponds to the center point of the base of the case.

Offsetting the vent positions from one another may seem counterintuitive from a fluid intake point of view, but therein lies an important aspect of the present invention. That is, offsetting the respective positions of the fluid provider assembly intake vent and the intake vent of the case itself actually enhances the sound damping abilities of the case without affecting or negatively impacting the fluid flow into the case or the subsequent fluid flow into the fluid provider assembly positioned therein.

The peripheral sidewalls of the case preferably include a front sidewall, an opposed back sidewall, a first lateral (left) sidewall and an opposed second lateral (right) sidewall. The sidewalls can be substantially integral (i.e., wrapped) or individual and joined (i.e., sewn at seamlines). Preferably, an additional external sidewall is positioned on the outer surface of the back sidewall and connected proximate the base and lateral sidewalls to form a pocket having an opening proximate the top side of the case. A foldable auxiliary pad is preferably provided, foldably positioned in the pocket. The auxiliary pad can be used when the surface from which the object (load) or person is to be moved is not ideal for producing the fluid film on which the transfer device effectively floats during at least a portion of the transfer. Additionally, and potentially more importantly, the auxiliary pad can also be used to effectively extend a surface by providing a bridge to span the distance between adjacent transfer surfaces (i.e., a bed and a gurney). This can be especially helpful if the transfer surfaces are not coplanar or if there is a significant gap between transfer surfaces, as mentioned above.

A plurality of leg members are also provided on the case, extending from the outer surface of the base in a direction substantially perpendicular thereto. The leg members are preferably dimensioned to enable substantially uninhibited fluid flow access to the fluid intake vent of the case when the base of the case is proximate a surface on which the case is resting. Thus, the case can be stably positioned on a surface while fluid is still allowed to flow underneath the case, through the vent in the base, and into both the case and the fluid provider assembly positioned therein.

It is also preferred that the case further includes a closeable flap member positioned on a portion of the top side in a sufficient location to provide direct access to the output end of the fluid provider positioned within the case when the closeable top side of the

case is in a closed position without opening the entire top side of the case. The closeable flap member also contributes to the sound damping qualities of the case in that the operational control features of the fluid provider assembly can be directly accessed and used without removing the fluid provider from the case, and without completely opening the entire top side of the case. The structure and design of the case permit fluid flow into the case in such a way that the fluid provider can safely and effectively operate even while being substantially enclosed to reduce the noise output.

The case also preferably includes a plurality of securing straps extending from an inner surface of the back sidewall of the case. Additional securing straps can also be positioned to extend from at least one of the lateral sidewalls, although these straps are usually used to secure other components of the portable fluid provider system, like an inflatable transfer device and connection tubing. It is particularly preferable, however, to include a plurality of securing straps extending from the inner surface of the base side of the case. The straps secure the fluid provider assembly in a central position within the case, such that the center of gravity of the fluid provider assembly is also centrally located. This improves the portability of the system by making it easier for a user to carry and by preventing the fluid provider assembly from tipping or shifting in the case when the case containing the fluid provider assembly is moved from one location to another.

It is also preferable to include at least one vent positioned on at least one of the first and the second lateral sidewalls, and at least one vent on the flap member of the top side to facilitate fluid exchange between the case and the atmosphere surrounding the case to prevent overheating of the fluid provider assembly positioned within the case. Providing vents on at least one of the sidewalls further increases the amount of fluid that flows into the case and improves the overall performance of the fluid provider assembly positioned therein.

## BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the nature and objects of the invention, reference should be made to the following detailed description of a preferred mode of practicing the invention, read in connection with the accompanying drawings, in which:

FIG 1. is a front view of an embodiment of a fluid provider according to one embodiment of the present invention;

FIG. 2 is a rear view of the fluid provider shown in Fig. 1;

FIG. 3 is a top view showing the output end of the fluid provider shown in Fig. 1;

FIG. 4 is a bottom view showing the intake end of the fluid provider shown in Fig. 1;

FIG. 5 is a right-side view of the fluid provider shown in Fig. 1;

FIG. 6 is a left-side view of the fluid provider shown in Fig. 1;

FIG. 7 is an exploded perspective view of the intake end of a fluid provider assembly according to one embodiment of the present invention;

FIG. 8 is a perspective view of the output end of a fluid provider according to one embodiment of the present invention;

FIG. 9 is a perspective view of a coupling plate and connector hose according to one embodiment of the present invention;

FIG. 10 is a perspective view of the sound damping carrying case according to an embodiment of the present invention;

FIG. 11 is a bottom perspective view of the sound damping carrying case shown in Fig. 10;

FIG. 12 is a perspective view showing the relationship between the structural features of the fluid provider and the sound damping carrying case;

FIG. 13 is a perspective view of the portable fluid provider system; and

FIG. 14 is a perspective view of the portable fluid provider system.

## DETAILED DESCRIPTION OF THE INVENTION

Figs. 1-6 are various non-perspective views showing an embodiment of a vertically oriented fluid provider according to the present invention, and are best read in conjunction with the perspective views shown in Figs. 7 and 8. The elongate fluid provider housing **100** includes an intake end **10** and an opposed output end **40**. A fluid pressurization unit **50** (see Fig. 7) is positioned within the housing **100** proximate the intake end **10**. The fluid pressurization unit **50** is spaced a distance from the intake end **10**, and an intake shield **51** is interposed therebetween. A motor unit **60** (not shown) is positioned within the housing **100,** interposed between the fluid pressurization unit **50** and an output shield **45** located proximate the output end **40** (see Fig. 8).

A plurality of flat surfaces **110, 111** are provided on exterior portions of the fluid provider housing **100**, which is otherwise substantially cylindrical in shape. These flat surfaces **110, 111** can be provided with a variety of attachments to aid in the transportability and connection capabilities of the fluid provider assembly. For example, a hook-and-loop type fastener can be provided on the flat surfaces **110, 111** which is configured to mate with a

corresponding hook-and-loop type fastener on a portion of an uninflated transfer device. In that manner, the transfer device and the fluid provider can be toted together. A plurality of wheels can also be attached to a portion of the flat surfaces **110, 111** as a transportation feature. Moreover, output attachments, such as adapters or fluid conduit extensions, can also be attached to the fluid provider assembly at flat surfaces **110, 111**. It is also possible to provide a specialized adapter on one of flat surfaces **110, 111** configured to be positioned and secured directly atop an inlet port of a transfer device without the need for hoses or extension adapters. Notwithstanding the above features, the exact overall shape of the fluid provider housing **100** is not critical, however, and a variety of shapes may be substituted for the cylindrical embodiments shown herein without departing from the scope and spirit of the present invention.

For the embodiments shown in Figs. 1-8, the intake end **10** is preferably provided with an intake faceplate **20**, shown in more detail in Fig. 4, or alternatively, a coupling plate **30**, as shown in Fig. 9. The intake faceplate **20** can be configured to be substantially permanently connected to the intake end **10**. As shown in Fig. 7, however, the intake faceplate **20** is configured to be detachably connected to the intake end **10**, and the coupling plate **30** is also configured to be detachably connected to the intake end **10** of the fluid provider housing **100** in place of the intake faceplate **10** to facilitate a series link with the output end of another fluid provider. The structure and function of the coupling plate **30** are described in more detail with reference to Fig. 9 herein below.

The intake faceplate **20** includes a centrally positioned intake vent comprising a plurality of fluid receiving (vent) openings **22**. As shown in Fig. 4, the pattern of the vent openings **22** can include a variety of elongate shapes radiating from a central hub along with a plurality of circular or elliptical openings interposed therebetween. The exact pattern and shapes of the fluid intake vent openings **22** is not limited, however, so long as a sufficient amount of fluid can be received therethrough. The design of the fluid intake vent also contributes to the noise reducing features of the present invention by damping the sound emitted from the fluid pressurization and motor units operating within the fluid provider housing **100**.

The intake end **10** also includes a plurality of leg members **23** disposed around the circumferential periphery of the intake faceplate **20**. The leg members **23** extend away from the plane of the intake faceplate **20** in a direction that is substantially perpendicular thereto. The exact shape, height, number and position of the leg members **23** is not critical, so long as the fluid provider housing **100** can be stably supported thereon when arranged in a vertical

orientation, such that the intake end **10** closest to the supporting surface is spaced a distance therefrom by the height of the leg members **23**. It is preferred, however, that at least three leg members **23** be provided, and that each of the leg members **23** have a height of at least 0.5 inch in order to optimize the fluid flow into the intake vent openings **22**.

A pair of diametrically opposed strap guides **25, 26** are respectively provided on the left and right hand sides of the intake faceplate **20**. The strap guides **25, 26** are used in conjunction with the securing straps on the base side of the sound damping case **200**, which is shown in Figs. 10-14 and described in more detail below.

As shown in Fig. 7, the intake faceplate **20** also includes a filter access door **24** positioned in a central location to provide access to a filter **28**. The intake shield **51** is inset a distance from the outermost portion of the intake end **10** such that the filter **28** can be positioned between the intake shield **51** and the outermost edge of the intake end **10**. The position of the filter access door **24** on the intake faceplate **20** corresponds to the location of the filter **28**. Further, the filter access door **24** can include a hinge **27** as shown, or otherwise be provided with a removable connection interface with respect to the intake faceplate **20** in order to provide access to the filter **28** when the intake faceplate **20** is secured to the intake end **10** of the fluid provider housing **100**. The filter access door **24** can also comprise a portion of the intake vent, in that some of the vent openings **22** of the intake vent can be positioned on the filter access door **24** as shown in Fig. 7.

Fig. 8 is a perspective view of the output end **40** of a fluid provided according to one embodiment of the present invention. The output end **40** includes a plurality of connection and operational components for the fluid provider **1**. As also shown in Fig. 3, the output end **40** includes a power supply connection **41** configured to receive a 3-prong power connector. This power supply connection **41** is adapted to receive a corresponding connector provided on an AC power cord, for example, or a connector for an auxiliary power source, such as a DC battery source, which can be transported and used within the carrying case described below. It should be noted, however, that a standard AC connection cord preferably can not be used to provide the connection between the fluid provider and a DC power source for safety reasons. This is especially relevant when the fluid provider is used in the medical industry, which requires particular (i.e., hospital grade hubble plugs) power connectors having green-dot approval. Providing an auxiliary power source that can be contained within the portable case increases the level of portability of the fluid provider of the present invention. Moreover, such an auxiliary power source eliminates the need to employ an externally extending AC power cord connection and the undesirable tether aspect of such

cords. This also improves the functionality of the fluid provider with respect to portability and maneuverability.

The output end **40** also includes an operational switch **43**, that is, an ON/OFF switch, which can be enclosed by a switch cover **44** to prevent accidental or otherwise unintentional power activation or power termination to the fluid provider. The switch cover **44** can be hingeably connected to the output end **40** as shown in Figs. 3 and 8, or otherwise removably connected to allow only deliberate access to the operational switch **43**. A pair of strap guides **47, 48** are also provided. A separate carrying strap (not shown) can be laced therethrough to aid in carrying the portable fluid provider assembly.

Figs. 3 and 8 also show that the output end **40** further includes a fluid conduit coupler **42** configured to receive and mechanically, twistably lock-in one end of a fluid conduit (i.e., hose, not shown), the other end of which is adapted to be connected to a fluid receiving port provided on an inflatable apparatus (e.g., transfer device). The fluid conduit can be a hose, like the connector hose **33** shown in Fig. 9. The fluid conduit can also be any one of a variety of fluid conducting members, such as PVC tubes or other flexible or rigid attachment members or adapters. A short fluid conduit can be employed in place of a hose-like fluid conduit to eliminate the unnecessary and undesirable tether aspect of long hosing and further improve the portability and maneuverability of the fluid provider of the present invention.

Additionally, a multiple conduit branch connector can be attached to the coupler **42** so that a single fluid provider can provide fluid to a plurality of fluid receptacles. It should also be noted that the terminal end of the fluid conduit can be fitted with a variety of adapters configured to attach to different fluid receiving ports on different fluid receptacles in various manners. One example includes an adapter having a substantially planar mating surface provided with a hook-and-loop type fastener (i.e., Velcro®) that is configured to attach over a port such as a fluid receiving port of a material mover, for example, having a corresponding hook-and-loop fastener provided on the periphery thereof.

The fluid conduit coupler **42** can also be configured to directly receive a coupling member **32** provided on the coupling plate **30** shown in Fig. 9, which is connected to the intake end **10** of another fluid provider (not shown). This series-type connection of sequentially oriented fluid providers increases the ultimate output pressurization of the final output end **40** of the series of fluid provider assemblies to a degree that would not otherwise be possible using a single fluid provider. This eliminates the need for providing multiple

filling ports/positions on the fluid receiving apparatus, and enables faster and more efficient fluid transfer from the fluid provider.

As mentioned above, Fig. 9 shows that the removable coupling plate **30** can be connected (by a press-fit, for example) to the intake end **10** in place of the intake faceplate **20** to facilitate a series connection with another fluid provider, or with a series of other fluid providers. The coupling member **32** can also connect to an intermediate hose **33**, as shown in Fig. 9, or directly to the fluid conduit coupler **42** of the output end **40** of another fluid provider (not shown). It should be noted, however, that providing an intermediate connection hose can help absorb, and thus reduce, system vibrations and provide a secure connection that is not subject to separation during operation of the fluid provider.

The fluid provider assembly of the present invention can be transported in and operated from a position within a sound damping case **200**, as shown in Figs. 12-13. Figs. 10-14 show various perspective views of the sound damping case **200**, hereinafter referred to simply as the "case" **200**, which includes a substantially rigid bottom side or base **210**, and a plurality of peripheral sidewalls, which can be rigid, semi-rigid or flexible. The peripheral sidewalls extend from the peripheral edges of the base **210** in a direction substantially perpendicular thereto, and substantially surround the base **210.** The peripheral sidewalls include a front sidewall **230**, a back sidewall **240**, a first (e.g., left) lateral sidewall **250**, and an opposed second (e.g., right) lateral sidewall **260**.

The case **200** also includes a closeable top side **220**, one edge of which can be hingedly attached to a top portion of any one of the peripheral sidewalls. It is preferred, however, that the top side **220** is hingedly (flap-like) attached to a portion of the top edge of back sidewall **240**, as shown in Figs. 12 and 13. The top side can be integral with the back sidewall as shown in Figs. 12 and 13, or flapably attached via a seam-line, zipper, or other joining means. The top side **220** can be positioned and secured (e.g., zipped as shown, or snapped or attached using Velcro®) over the lengths of the top edges of the other sidewalls to completely close the case **200**.

Fig. 10 shows the closeable flap member **221** positioned on the top side **220** to provide direct access to the operational components located on the output end **40** of a fluid provider positioned within the case **200** without having to fully open the entire top side **220**. This feature optimizes the sound damping qualities of the case **200** in that operational access can be gained without exposing the fluid provider to any significant degree, thereby containing (i.e., damping) the noise generated by the fluid provider without hindering operational efficiency. This sound damping aspect of the present invention holds special

significance in situations where the fluid provider assembly is used in a medical facility, such as a hospital or nursing home, where disturbances to patients should be limited as much as possible. Thus, the case **200** effectively reduces the excess noise associated with operating the fluid provider of the present invention and provides a secure carrying means for transporting the fluid provider assembly.

As best shown in Figs. 10 and 11, a plurality of leg post members **212** extend downwardly from the outer surface of the base **210** in a direction substantially perpendicular to the plane thereof. The leg members **212** are positioned at various locations around the periphery of the base **210**, particularly proximate the corners thereof. As shown, some of the leg members **212** are somewhat centrally positioned to provide added support for a fluid provider which is likewise centrally positioned within the case **200**. The support provided, which is attributed to the position of the leg members **212**, is but one attribute of the leg members **212**, however, and another important attribute of the leg members **212** is that they elevate the base **210** from the support surface (e.g., floor) to enable sufficient and substantially uninhibited fluid flow into the case **200** from the base **210**, as described below.

A fluid intake vent **211** is provided on the base **210** in a first position, which is at least laterally offset from the center point of the base **210**. That is, it is preferred that the fluid intake vent **211** be offset from a corresponding fluid intake vent **22** on the intake end **10** of a fluid provider which is preferably centrally positioned and secured within the case **200** as described above. Offsetting the vent positions in this manner further enhances the sound damping capabilities of the case **200** without hindering the fluid flow between the intake vent **211** of the case **200** and the intake vent openings **22** of the intake end **10** of the fluid provider assembly.

As shown in Figs. 10-14, an additional fluid vent **261** can be provided on a portion of one of at least one of the first and second lateral sidewalls (**260** as shown) to further increase the amount of fluid flow into the case **200**. Positioning the vent **261** in this manner effectively increases the fluid available to the intake end **10** of a fluid provider assembly positioned within the case **200** without compromising the sound damping qualities of the case **200**. It is also desirable to provide such a vent in order to reduce the chances of overheating the fluid provider assembly positioned within the case **200**. Along those lines, yet another vent **222** is positioned on the closeable flap member **221** of the top side **220**. In that manner, when the flap member **221** is in the closed position, such that the operational controls positioned on the output end **40** of the fluid provider housing **100** positioned within the case **200** cannot be directly accessed, fluid (i.e., air or liquid) can exit the case **200** through the

vent **222**, which can prevent overheating of the enclosed fluid provider assembly in the event it is accidentally turned on while the flap member is closed.

As shown in Fig. 12, the unique structural relationship between the components of the case **200** and the fluid provider assembly yield the novel configuration of the present invention. In order to provide and maintain the proper relationship between components, a plurality of securing straps are provided within the case **200** to fix the location of the fluid provider assembly positioned therein. As shown in Fig. 12, a pair of securing straps **214** (the left-hand strap is hidden in Fig. 12) are provided to extend from the inner surface of the base **210** on either side of the center point thereof, such that one end of each of the straps **214** is affixed to the base **210**. The sides of the fluid provider housing **100** proximate the intake end **10** are preferably equipped with strap guides **25, 26** as mentioned above, in the form of molded loops or other protruding members through which the un-affixed ends of the straps **214** are laced. Each strap **214** is then doubled over and re-secured to itself via a hook-and loop type fastener, such as Velcro®, which is provided thereon. The straps **214** prevent undesired lateral movement and inhibit vertical displacement of the fluid provider assembly positioned within the case **200**.

It is also preferred to include a plurality of securing straps extending from at least one of the plurality of peripheral sidewalls. As shown in Fig. 12, a pair of securing straps **242, 243** are provided such that one end of each strap **242, 243** is affixed to a portion of the back sidewall **240**, and the other end extends at least partially around the outer circumference proximate the output end **40** of a fluid provider housing **100** positioned within the case **200.** Strap **243** is laced through a loop member provided at the distal end of strap **242** and re-secured onto itself using a hook-and-loop type fastener, such as VELCRO®. Ultimately, the two straps **242, 243** essentially circumscribe the fluid provider and lend stability. Thus, the portable fluid provider system includes all of the necessary components required to move an object or person between locations, all contained within a single, compact carrying case that dampens operational sound.

As shown in Fig. 12, other securing straps **252, 262** extending from the lateral sidewalls **250, 260** can also be provided. The additional securing straps **252, 262** can be used to maintain the position of other occupants of the case **200**, such as an un-inflated transfer device **300** or connector tubing **310** located on either side of the fluid provider. As shown in Fig. 13, however, the un-inflated transfer device **300** and the connector tubing **310** positioned within the case **200** are not secured using the above-mentioned straps **252, 262**. Instead, the

sheer bulk of these occupants helps to secure the position of all of the occupants within the case **200**.

Fig. 14 shows the fully closed sound damping carrying case **200** having the fluid provider assembly of the present invention positioned therein. The pocket **245** provided on the backside **240** (see also Fig. 12) holds a folded auxiliary pad **320**. The auxiliary pad **320** is preferably semi-rigid, at least in sections, and is useful for enhancing the transfer surface to allow the transfer device to produce a more efficient fluid film from the fluid provider. Additionally, the auxiliary pad **320** can be used to extend the transfer surface, for example, to bridge a gap between a bed and a gurney or provide a ramp over a stepped section of flooring.

While the present invention has been particularly shown and described with reference to the preferred mode as illustrated in the drawings, it will be understood by one skilled in the art that various changes in detail may be effected therein without departing from the spirit and scope of the invention as defined by the claims.